

Title: Blacktop Games

Link to Outcomes:

- **Problem Solving** Students will develop and apply a variety of strategies to solve problems with emphasis on multi-step and non-routine problems.
- **Communication** Students will discuss mathematical ideas and make convincing arguments.
- **Reasoning** Students will understand and apply reasoning processes with special attention to spatial relationships. Students will appreciate the pervasive use and power of reasoning as a part of mathematics.
- **Connections** Students will explore problems and describe results using graphical and verbal mathematical representations.
- **Measurement** Students will extend their understanding of the process of linear measurement. Students will select appropriate measuring units and tools to measure to the degree of accuracy required in a particular situation. Students will develop procedures for determining methods to solve problems.
- **Geometry & Spatial Sense** Students will represent and solve problems using the geometric model. Students will understand and apply geometric properties and relationships. Students will develop an understanding of how geometry is used to describe the physical world.

Brief Overview:

This is a multi-day mathematics and language arts lesson plan. Using scale drawings students will do a whole class task for a cafeteria setting, a guided practice task for a kindergarten classroom, and an independent task for a blacktop playground area. During the independent task the students will also write a letter requesting funds for this project.

Grade/Level:

Grade 5 mathematics and language arts

Duration/Length:

This lesson may range from 4 to 5 periods depending on the background of the students.

Prerequisite Knowledge:

Students need a basic understanding of :

- use of measuring tools (metric rulers and compasses)
- linear metric units
- scale drawings
- blacktop games (i.e. four-square, hopscotch, etc.)

Objectives:

Students will be able to:

- design a blacktop game area for a school playground.
- draw a scale replica of the blacktop games area.
- write a persuasive letter to an organization seeking funds to carry out the plan.

Materials/Resources/Printed Materials:

Prepare in advance for Day 1 Task 2:

- Bulletin board chart paper (approximately 80 cm x 100 cm)
- Teacher pattern Worksheets 2A & 2B

Materials needed for each student:

- Metric ruler
- Compasses
- Pencils
- 8 ½ x 11" paper (several sheets)
- Scissors
- Glue
- Composition paper
- Worksheets for Task 3A & 3B
- Worksheets for Task 4A & 4B

Development/Procedures:

Before beginning, group students in pairs to work as indicated in the lessons.

Day 1:

Task 1

Students work as a whole group for instruction and review. They will use metric rulers and compasses, drawing shapes of given dimensions and practicing using appropriate tools. Teacher may assign such shapes to draw as:

<u>Rectangles</u>	<u>Circles</u>
2 cm x 5 cm	4 cm
6 cm x 16 cm	8 cm
4 cm x 4 cm	12 cm

Students work in pairs to check for accuracy while the teacher circulates to “spot check” work.

Review scale drawings by asking students which of the shapes previously drawn would relate to a table that was 1 m x 2.5 m if the scale was 2 cm=1 m. Continue with other examples.

Task 2

Tell students that these skills in making scale drawings are used in designing room arrangements. (Use the prepared chart materials for this task.) Students will work as a whole group to plan an arrangement of tables for a cafeteria. Present the problem that the table arrangement needs to be efficient arrangement for cafeteria seating. Remind students allow room to slide out chairs, walk between tables, and flow to and from the lunch line. Have individuals place the table shapes on the chart, and let the class evaluate the suggested arrangement of the completed chart in whole group, discussing the practicality and efficient use of space.

Day 2:

Task 3

Review the chart of yesterday’s cafeteria arrangement. Tell students to work in pairs to plan a scale drawing of a kindergarten classroom arrangement for furniture. Assist students as needed. Use Worksheets Task 3A & 3B. At the end of the period, allow each pair to share their arrangements with the class.

Day 3:

Task 4

Present the class with this situation: plan an area for blacktop games during recess. Discuss the format of games such as four-square and variations of hopscotch. (The teacher can determine the suitability of game choice.) Include discussion of what the game area looks like and how the game is played in relation to space needed. Use the teacher reference sheet 4A for examples. The task is to plan three game areas on a scale drawing of the playground blacktop. Students will work individually. Use student Worksheet Task 4B.

Task 5

Tell students that in order to carry out these plans they will need permission to paint the game area on the blacktop. Each student will then write a persuasive letter to the principal asking permission for this project. The letter must use correct business letter format and include several reasons for support. The letter will be evaluated using the state (Maryland) rubric for writing to persuade.

Evaluation:

Task-specific Scoring Key

For the blacktop playground area plan, evaluate students using the task-specific scoring key given below. Match the appropriate description with the student's work.

A "2" plan should have:

- consistently accurate scale drawings
- clearly designed, original games areas
- well developed appearance

A "1" plan should have:

- some accurate scale drawings
- appropriate game areas
- satisfactory appearance

A "0" plan should have:

- consistently inaccurate scale drawings
- inappropriate games areas
- weak appearance

Persuasion Letter Rubric

For the persuasion letter, evaluate letters using the following rubric. Remember this is another judgement call by the teacher to match the appropriate description with the student.

A letter with a score of "4" has:

- appropriate content with superior, original reasons
- appropriate letter format
- attention to target audience
- consistent and appropriate use of varied sentence structures and mechanics

A letter with a score of "3" has:

- appropriate content with satisfactory reasons
- appropriate letter format (business)
- attention to target audience
- satisfactory and appropriate use of varied sentence structures and mechanics

A letter with a score of "2" has:

- minimal content with weak reasons
- incomplete letter format
- limited attention to target audience
- weak use of sentence structures and mechanics

A letter with a score of "1" has:

- minimal content with no specific reasons
- incomplete or no letter format
- no attention to target audience
- frequent use of incorrect sentence structures (fragments and run-ons) and no effort to use mechanics

NR (no response) means no letter was submitted for evaluation.

Extension/Follow Up:

Task 4

Students share their designs of the playground. Select the best design to use for the playground. If permission is granted, the students may actually plot the game areas on the playground and have them painted by the custodian or a parent volunteer.

Task 5

The teacher may select one of the students' letters as the letter to request permission from the principal.

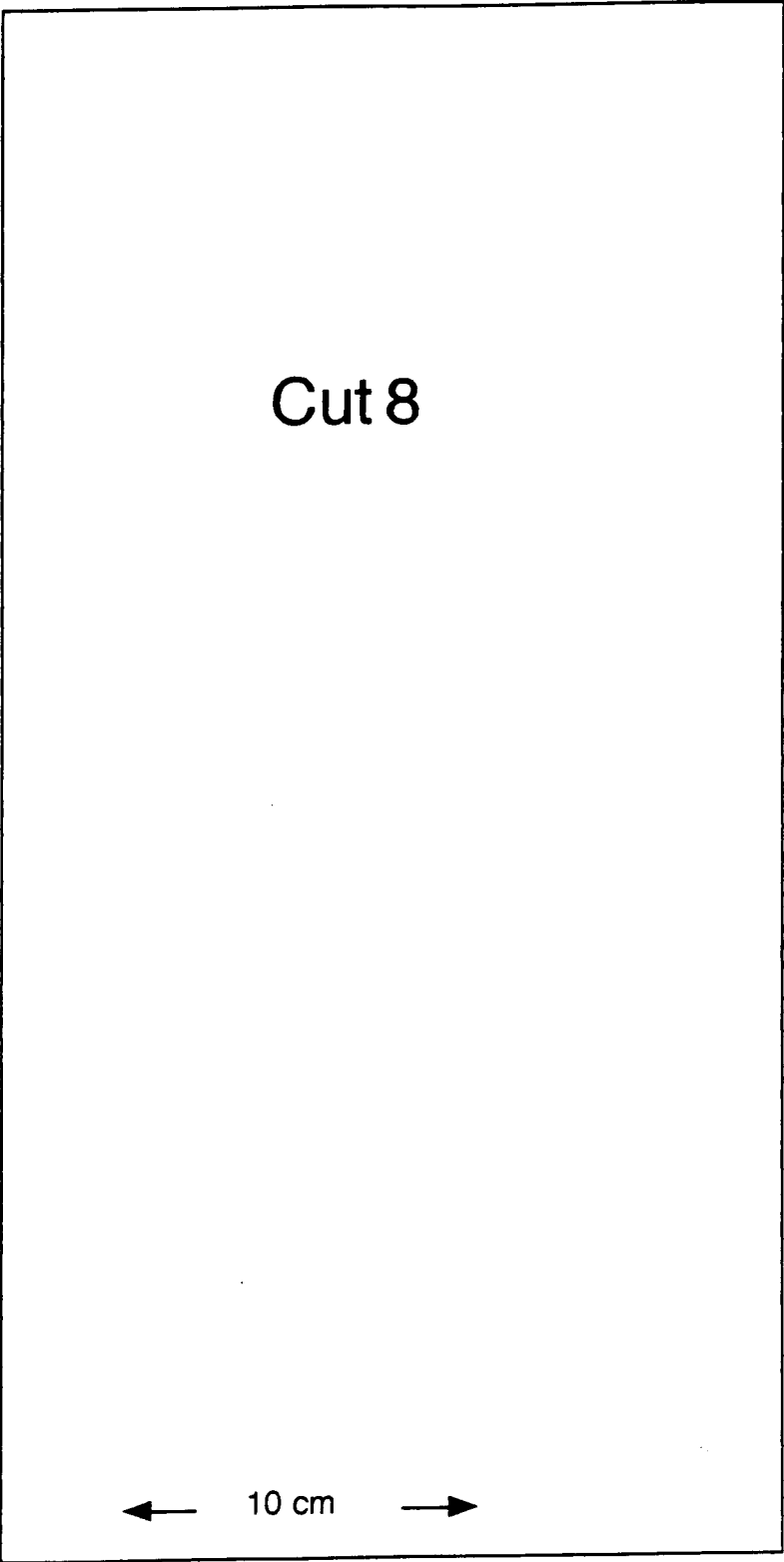
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Task 2a

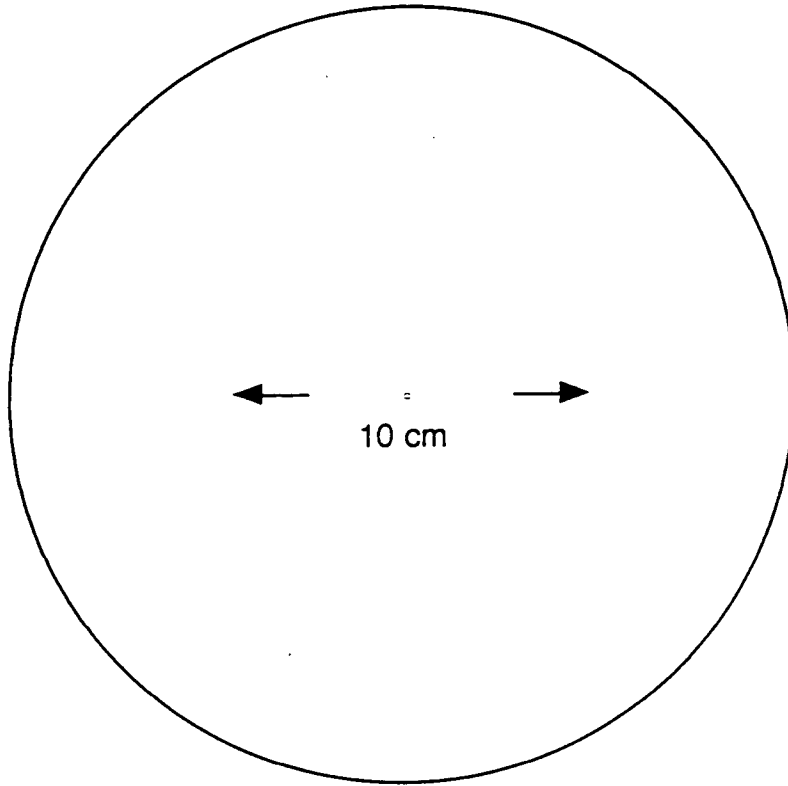
Teacher Worksheet Pattern



Task 2b

Teacher Worksheet Pattern

Cut 6



Task 3A

Directions for Kindergarten Classroom

You will draw on a separate sheet of paper the following classroom furniture that will be measured to the scale drawing sizes specified below:

Scale is 2 cm = 1 m

- 4 tables (1m circle)
- 1 teacher desk (1.5m x 1m)
- 1 kitchen play unit (3m x 2m)
- 1 sand table (2m x 1m)
- 3 shelf units (3m x 1m)

Allow space around each piece of furniture to allow the kindergarten students movement around the room.

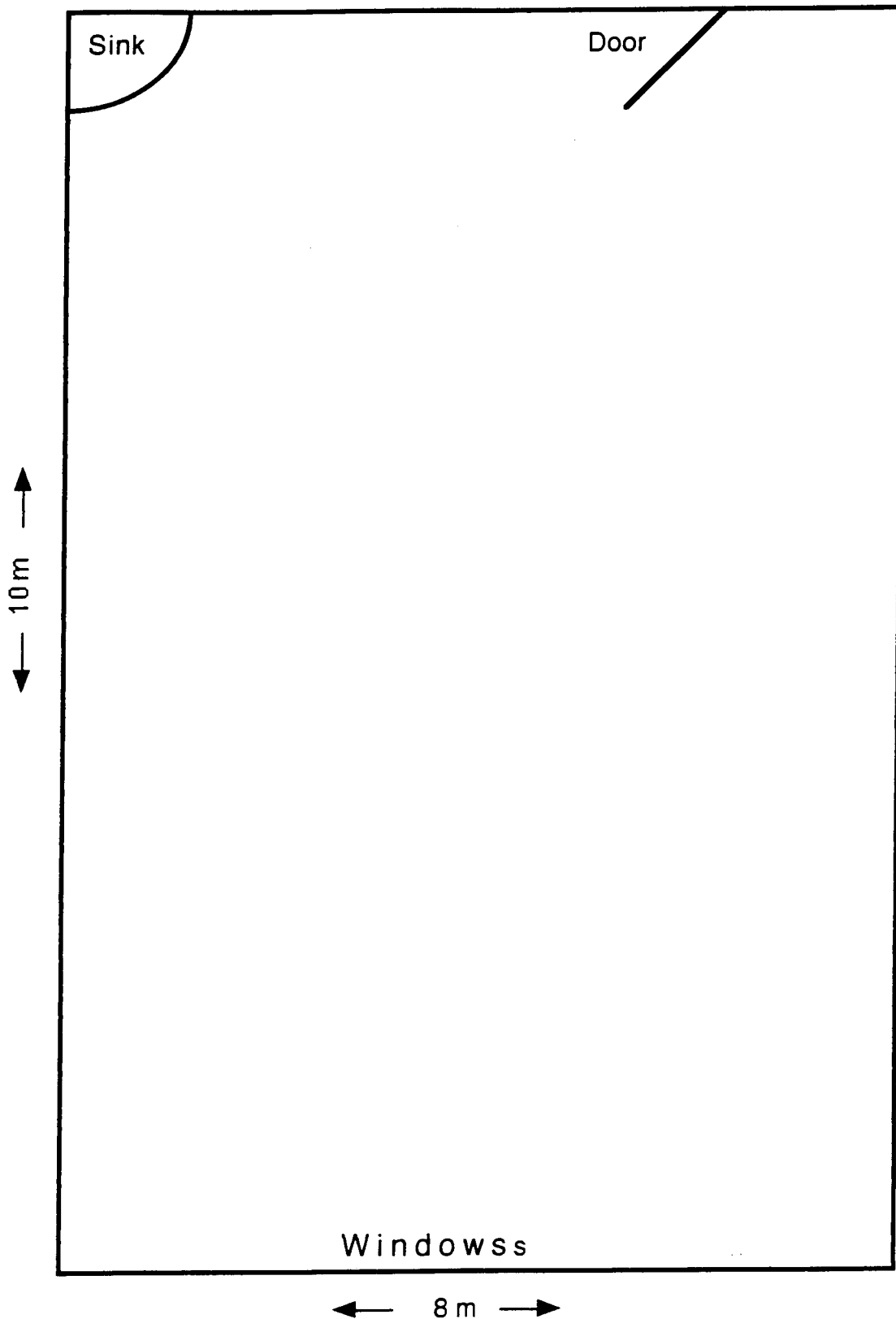
Arrange tables so that the teacher may instruct the entire group. You may want to create quiet areas and active play areas.

Draw and cut out the shapes. Arrange them in a way suitable for a kindergarten classroom.

Task 3b Worksheet

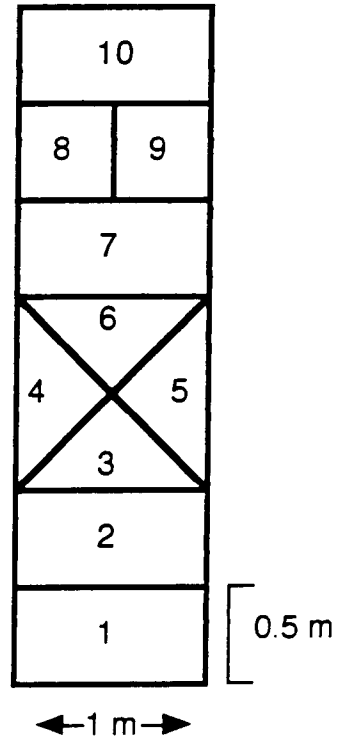
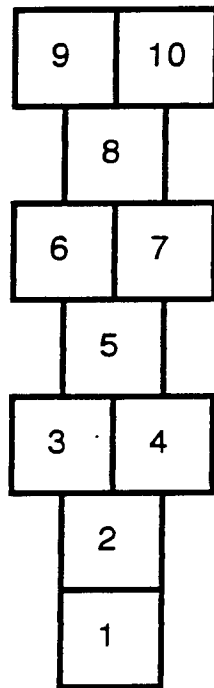
Kindergarten Classroom

Scale
2cm = 1 m



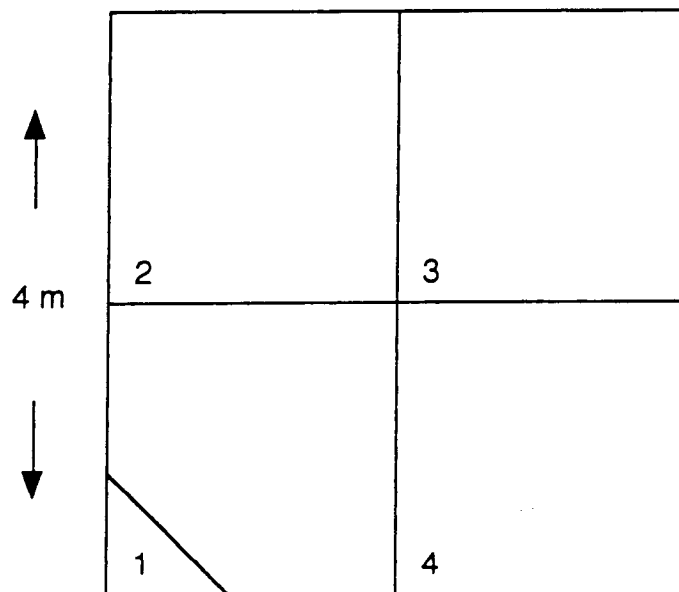
Task 4a

Suggested formats for hopscotch:



Each square measures 0.5 m on a side

Four-square format



Task 4B

Playground

